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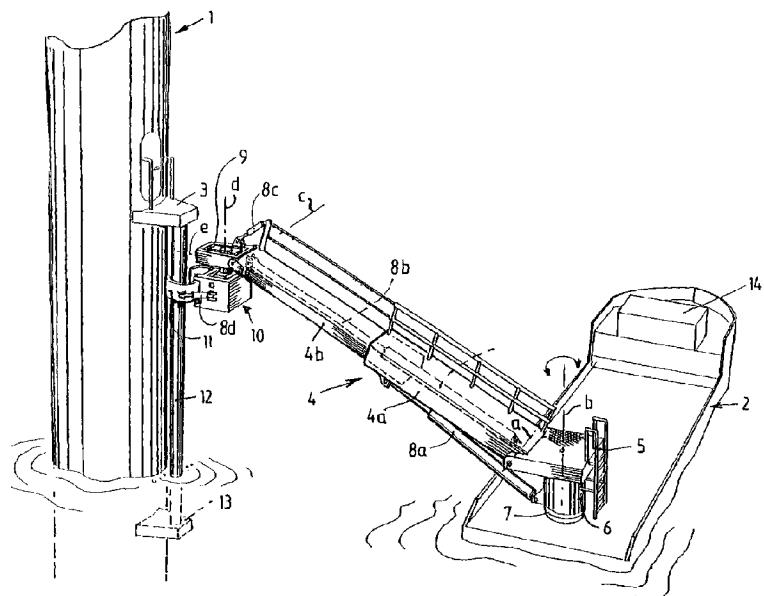
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(54) Title: A VESSEL, PROVIDED WITH A GANG PLANK FOR COUPLING TO AN OFFSHORE POLE STRUCTURE



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(57) Abstract: A vessel provided with a telescopingly extendable gang plank mounted thereon for movement about a vertical axis. A coupling device provided at the free end of the gang plank is adapted to enclose a vertically directed engagement rod on an offshore pole body and thus connect the ship to the pole body. With the ship manoeuvred in a certain position the gang plank may be either directed and extended towards the engagement rod or be manoeuvred while taking its extended position laterally into contact with the engagement rod and subsequently (partially) retracted again.



*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

Short title: A vessel, provided with a gang plank for coupling to an offshore pole structure.

The invention relates to a vessel as defined in the first part of claim 1.

Such a vessel is disclosed in French patent publication FR 2465640. With this well-known vessel that is adapted to transfer personnel to and from an offshore structure built on piles, the gang plank is designed to be provisionally connected to the offshore structure by means of a line that is to be "thrown out". Subsequently the line is "hauled in" to cause the gang plank to extend towards the connecting site. In this case the engagement rod is constituted by a curved rod which is positioned in a horizontal plane.

Throwing out a provisional connecting line is laboreous and also constitutes hazard for the personnel which has to be present at the end of the gang plank and to be coupled. Furthermore, with the well-known vessel, even moderate wave motion will cause the end of the gang plank to move up and down rather extensively, which up and down movements are difficult to be controlled by the inhauling line and thus make it very difficult to complete the connection to the horizontally oriented engagement rod.

The invention aims at providing a solution for the problem mentioned hereinabove.

According to the invention this aim is achieved through the features which are defined in the second part of claim 1.

Thus the vessel of the present invention is adapted to cooperate with, i.e. to be connected with its gang plank to an offshore pole body, that is provided with a substantially vertically directed engagement rod. In operation, as soon as the vessel of the present invention has reached a suitable starting position relative to the offshore pole body provided with a vertically directed engagement rod, the desired connection can be realized relatively simply. To this end, according to a practical procedure, the gang plank is turned and thereby directed to the central part of the engagement rod, upon which the gang plank is extended until the coupling device has enclosed the engagement rod. Up and down going

movements of the free end of the gang plank, which may be caused by the vessel bobbing on the waves, will not or hardly affect the coupling procedure, as the vertically directed engagement rod will allow the coupling device to move along the engagement rod during 5 coupling. In the horizontal plane the position of the coupling device can be simply adjusted through corrective turning movements.

By using a vertically directed engagement rod and a correspondingly adapted coupling device there is also an alternative way to realize the coupling. According to this alternative procedure the 10 gang plank positioned at a certain inclination is extended beyond the engagement rod after which the extended gang plank is laterally turned into contact with the engagement rod and then retracted to allow the coupling device to engage the engagement rod.

It is to be remarked that International Patent Application 15 WO 00/15489 discloses a vessel provided with a gang plank adapted to be coupled to an offshore pole body whereby - as with the vessel according to the above mentioned French patent publication - an engagement rod is positioned in a horizontal plane, but wherein no line needs to be thrown out for the coupling procedure. In this case 20 a non-extendable gang plank is involved, which is pivotally connected to the vessel about a horizontal transversally directed axis only. This well-known gang plank is provided at its free end with a pair of guide wheels through which the gang plank is pushed - in operation - by the vessel against the pole body and along the pole body upwardly 25 into the coupling position. With this well-known vessel the possibilities of manoeuvring are very limited, so that especially in case of heavy seas it is difficult to have the gang plank "approach" in the correct direction and - after the gang plank end having been brought into contact with the pole body - maintain such contact 30 during the further procedure. Consequently, in this case there is no question of a uniform guidance of the gang plank end along the pole body as a condition for an effective coupling procedure.

Finally it is to be remarked that independently extendable gang 35 planks are known per se, such as disclosed in US Patent Specification 4,366,591, wherein an hydraulically retractable/extendable gang plank or ladder is mounted with one end on a pier or dock and is adapted to have its free end resting freely onto the deck of a ship that lies moored along the pier or dock.

The invention will be hereinafter further explained by way of two examples with reference to the accompanying drawings, in which:

fig. 1 is a perspective view of the vessel of the present invention, showing the completion of the coupling of the vessel to an offshore "monopole", with the gang plank being directed substantially radially relative to the pole body;

fig. 2A is a perspective view of the vessel of the present invention in an alternative embodiment, wherein the gang plank is in its extended position and directed tangentially relative to an offshore monopole and

fig. 2B shows the vessel of fig. 2A in the same position relative to the monopole, but now with the (partially) retracted gang plank coupled to the monopole.

In fig. 1 there is shown an offshore pole, also called monopole. In practice this may be e.g. a supporting column of a windmill or a supporting leg of an offshore platform.

2 is a vessel, e.g. of the "service vessel" type, that carries the personnel that has to climb the pole 1 to carry out maintenance or repair work therein. To facilitate the carrying out of these activities the pole 1, which for the rest is substantially plane, is provided with a platform 3 projecting therefrom at working level.

In order that the personnel may safely cross from the vessel 2 to the platform 3 on pole 1 and vice versa at any time between high and low tide the present invention provides in the use of a retractable and extendable gang plank 4. One section 4a of it is pivotally connected, about a horizontal axis a, to a cross-over platform 5 at the upper end of a column 6, which is mounted on the deck of the vessel through a turntable 7 for a rotary movement about a vertical axis b.

An hydraulic piston cylinder device 8a extends between the column 6 and a location on the lower side of the gang plank section 4a and may adjust the angle of inclination of the gang plank 4.

The second section 4b of the gang plank 4, which may be retracted or extended by means of an hydraulic piston cylinder device 8a, has its free end pivotally connected - about a transverse axis c - to a cross-over platform 9 that may be kept in the desired (= horizontal) position relative to the gang plank 4 by means of an hydraulic cylinder 8c supported on the gang plank section 4b.

A coupling device 10 is suspended to the cross-over platform 9. The suspension is such that there is a certain freedom of movement about the mutually perpendicularly directed axes d and c, which axes are each perpendicularly directed relative to the pivot axis e.

5 The coupling device 10 serves to establish a coupling to the pole 1 at a location adjacent the platform 3. For this purpose the coupling device 10 is provided with two coupling jaws 11 which may be turned towards another from an opened position (shown in the drawing). The coupling jaws 11 are actuated by hydraulic piston  
10 cylinder devices 8d (one of which is shown in the drawing) on either side of the housing of the coupling device 10.

The piston cylinder devices 8d are making part of an hydraulic circuit, which also comprises the hydraulic piston cylinder devices 8a, 8b and 8c, as well as the drive means (not shown) for the  
15 turntable 7.

The coupling jaws 11 are adapted to cooperate with a coupling part provided on the pole, which coupling part - in the example under consideration - is constituted by a guide and coupling rod 12 that is suspended from the platform 3 and has its lower end supported by a  
20 bracket 13 projecting from the pole 1.

The operation is as follows. In the no-use mode the gang plank 4 is positioned according to the longitudinal axis of the vessel 2, while the plank has its extendable plank section 4b supported on the support 14 provided at the front of the vessel. With the gang plank  
25 in this position the vessel may go out for the transfer of one or more mechanics to the platform 3 on the pole 1 for carrying out work, such as the removal of defects. Upon approaching near to the pole 1 the ship 2 is positioned according to the prevailing wind direction. Then the hydraulic piston cylinder device 8a is actuated to lift the  
30 gang plank from the support 14 and thereafter the turntable 7 is hydraulically actuated to turn the gang plank into the position opposite the coupling rod 12 as shown in the drawing.

With the coupling jaws 11 swung open (as shown in the drawing) the gang plank 4 is (further) extended until the coupling rod 12 gets  
35 positioned between the coupling jaws 11, after which the coupling jaws 11 may close around the coupling rod 12. The hydraulic circuit may be arranged such that when the coupling jaws 11 are closing, the hydraulic drive means (not shown) for the turntable 7 will become

relieved of pressure, so that mutual angular displacements of the gang plank and the vessel can and may take place in the horizontal plane.

Furthermore closing of the coupling jaws will cause the piston cylinder devices 8b and 8c to become relieved of pressure, as a result of which the gang plank section 4b may freely move in and out and the distance from the pole 1 to the up and down bobbing vessel can and may vary, while the gang plank may also freely hinge relative to the cross-over platform 9 as the latter is now held in position by the closed jaws 11. Moreover, in this way, an extension of the gang plank will automatically take place when in the next and final stage the hydraulic piston cylinder device 8a is put in operation to move the coupling device 10 with its closed jaws 11 along the coupling rod 12 upwardly and place the cross-over platform 9 and thereby the outer end of the gang plank 4 at the level of the pole platform 3. When reaching the latter position locking in this position is taking place, while at the same time the hydraulic cylinder device 8a is also relieved of pressure, so that from this point of time the piston rod of the cylinder device may freely move in and out to allow rolling movements of the ship 2 (in the position shown in the drawing) to take place.

The cross-over of personnel via the (possibly slightly swinging) gang plank 4 and the cross-over platform 9 onto the platform 3 can now take place easily and safely, whereas it is equally easy and safe for the personnel to board the ship again after having finished the job.

With reference to fig. 2A and 2B the vessel shown therein is very similar to the ship of fig. 1. Corresponding parts have been designated by the same reference numbers as used in fig. 1, but increased by the number 100.

The vessel 102 is more particularly adapted to be positioned with its extended gang plank 104 oriented substantially tangentially relative to the monopole 101 (see fig. 2A), from which position the gang plank 104 can be readily retracted until the coupling between the vertically extending engagement/coupling rod 112 and the coupling device 110 is effected.

While carrying out the coupling procedure with the vessel in the embodiment of fig. 2A-2B the gang plank 104 will have its

slidable section 104b engaging the engagement rod 112. To this end the slidable section 104b is constituting the outer section of the telescopic gang plank and provided with side buffers 200.

Furthermore, the embodiment of fig. 2A-2B relates to a monopole 5 101, whereby a ladder 201 is provided behind the engagement rod 112. Upon completion of the coupling to the engagement rod 112 one can thus step from the platform 109 onto the ladder 201 and thereby onto the pole body without the need to first displace the gang plank end along the engagement rod 112 upwardly. Accordingly the hydraulic 10 cylinders 8a provided in the embodiment of fig. 1 have been substituted in the embodiment of fig. 2A-2B by an adjustable suspension bracket 202. In a way similar to the embodiment of fig. 1, the coupling device 110, the drive means (not shown in the drawing) for extending and retracting the gang plank and the actuating means 15 for the turntable 207 may be connected such, that when the coupling jaws of the coupling device 110 have closed about the engagement rod 112, the gang plank will be free to extend and retract and also free to turn relative to the vessel 102.

CLAIMS

1. A vessel provided with a telescopingly extendable gang plank which is connectable to an offshore pole body, said gang plank having one end movably mounted on the vessel about horizontal and vertical axes and carrying at its free end a coupling device which is adapted to cooperate with an engagement rod that projects from said pole body, characterized in that the coupling device is arranged to enclose a vertically directed engagement rod and that drive means are provided to allow the gang plank to extend independently.
2. A vessel according to claim 1, characterized in that the coupling device is suspended to the free end of the gang plank for movement about three mutually perpendicularly directed axes.
3. A vessel according to claim 2, characterized in that the retractable/extendable section of the gang plank has its free end pivotally connected, about a transverse axis that forms one of said three mutually perpendicularly directed axes, to a cross-over platform which carries said coupling device.
4. A vessel according to claim 3, characterized in that a longitudinally adjustable support rod is provided between the retractable/extendable section of the gang plank and said cross-over platform.
5. A vessel according to claims 1-4, characterized in that said coupling device is provided with coupling jaws adapted to move between closed and opened positions and to enclose said engagement rod.
6. A vessel according to claims 1-5, characterized in that the retractable/extendable section of the gang plank extends along the outer side of the stationary section of the gang plank.
7. A vessel according to claim 6, characterized in that the retractable/extendable section of the gang plank is provided with side buffers.
8. A vessel according to claims 4-7, characterized in that the coupling jaws, the drive means for turning the gang plank about a vertical axis and for retracting/extending said gang plank, as well as the longitudinally adjustable support rod are connected to a common pressurized circuit, more particularly an hydraulic circuit.

9. A vessel according to claim 8, characterized in that the pressurized circuit is arranged such that in the closed position of the coupling jaws at least the drive means for turning and retracting/extending the gang plank, as well as the adjustable support rod are automatically relieved of pressure.

10. A device according to claim 9, characterized in that the engagement rod suspends from a work platform fastened to the pole body and that the hydraulic circuit is further arranged such that the drive means for luffing the gang plank are automatically relieved of pressure when or as soon as the closed coupling jaws are in the upper position on the engagement rod.

11. A device according to claims 2-10, characterized in that a ladder is provided on the pole body, behind and substantially parallel to the engagement rod.

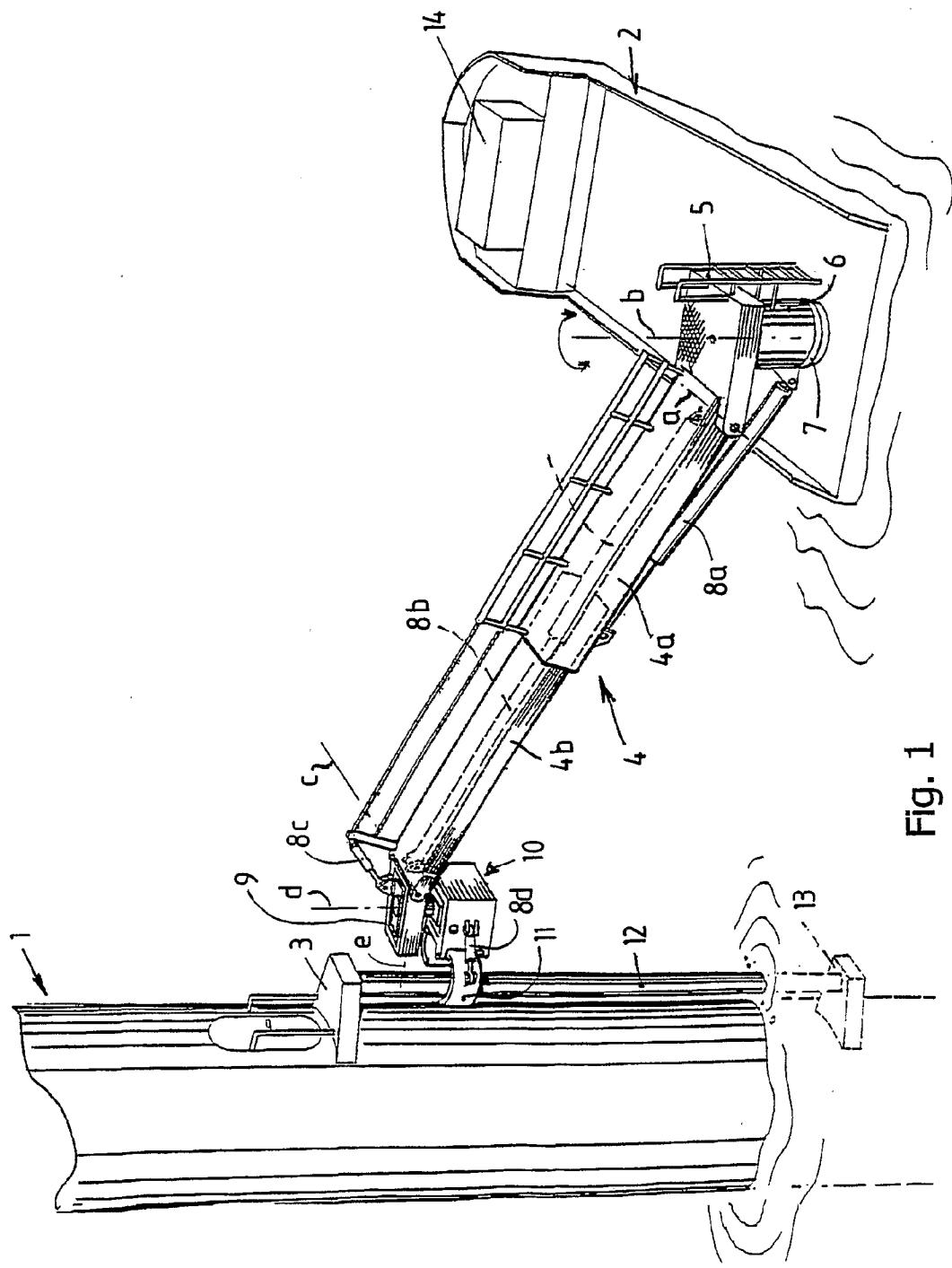
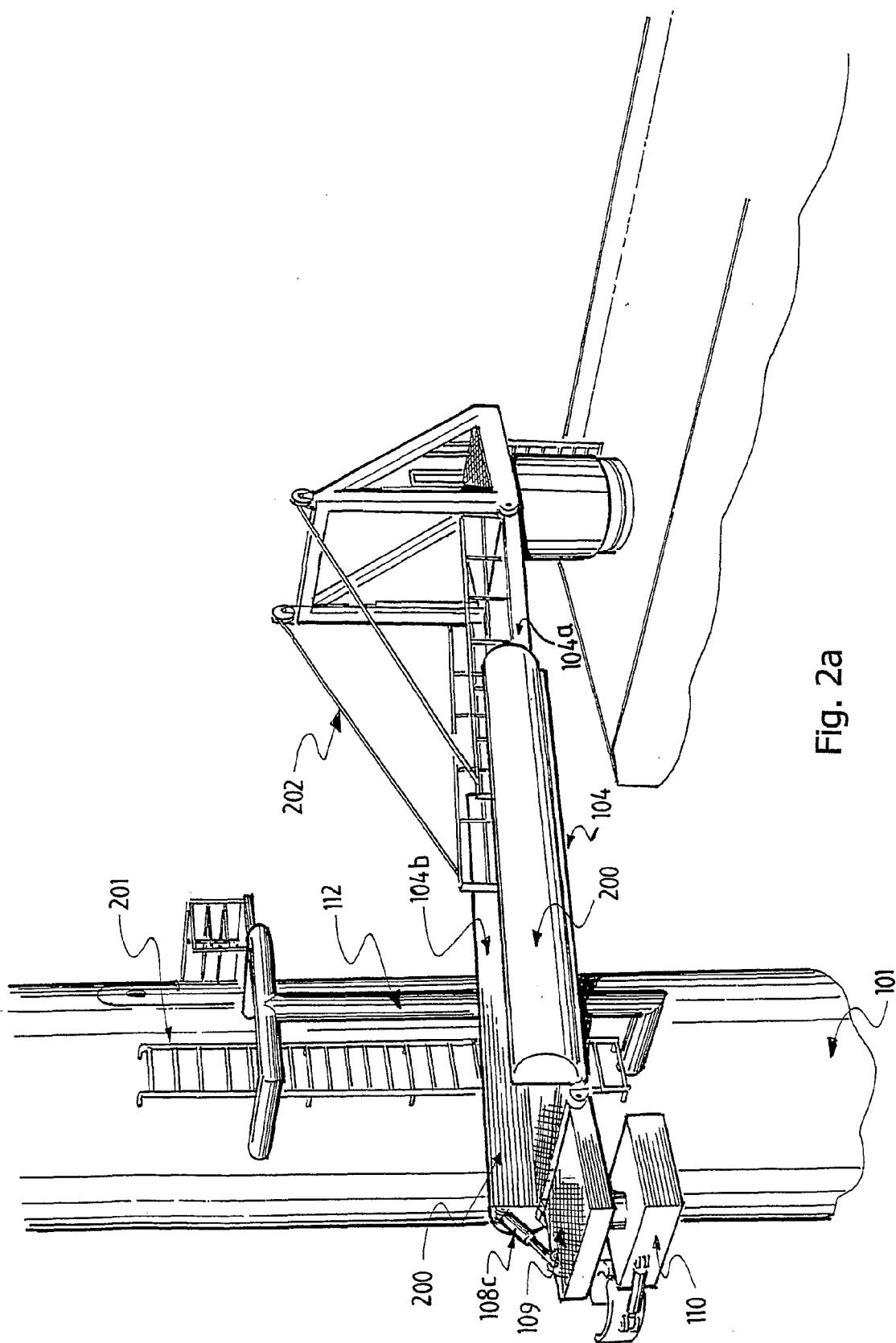
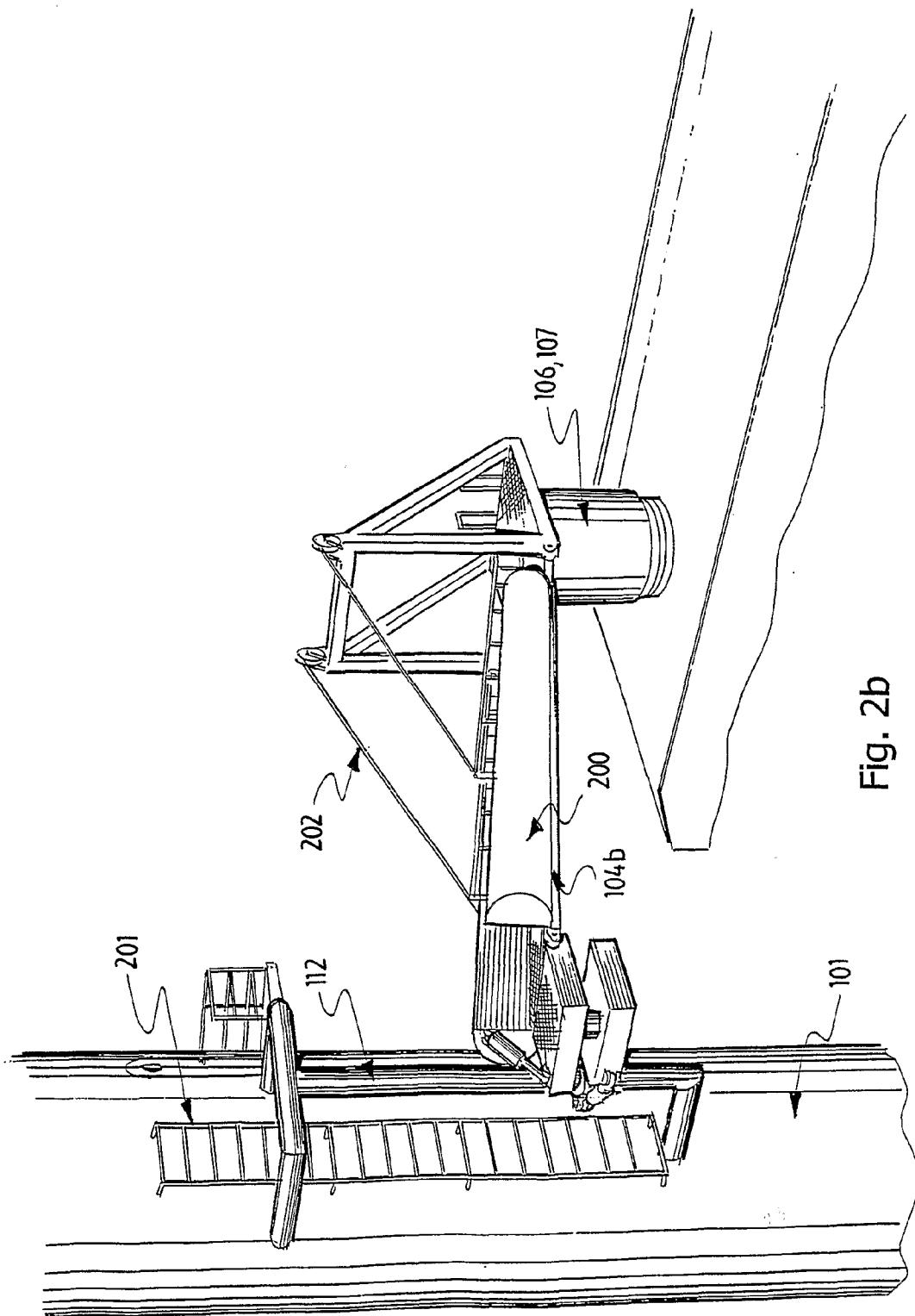


Fig. 1





# INTERNATIONAL SEARCH REPORT

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al Application No  
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**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 B63B27/30 B63B27/14

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 B63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 4 003 473 A (RYAN WILLIAM J) 18 January 1977 (1977-01-18) figure 41 ---	1
A	FR 2 465 640 A (CHAMBON CIE STE GLE REMORQ TRA) 27 March 1981 (1981-03-27) ---	
A	US 4 366 591 A (ZIMMERMAN MAHLON N) 4 January 1983 (1983-01-04) ---	
A	GB 2 336 828 A (OCEANTECH PLC) 3 November 1999 (1999-11-03) ---	
		-/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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## INTERNATIONAL SEARCH REPORT

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nal Application No  
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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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